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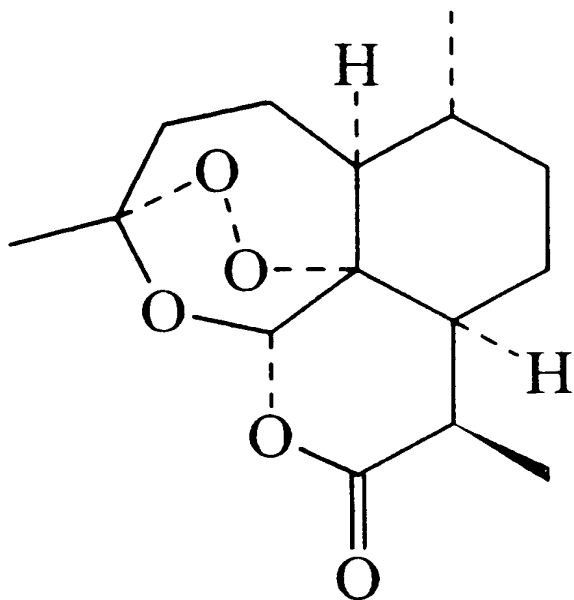


FIG. 1

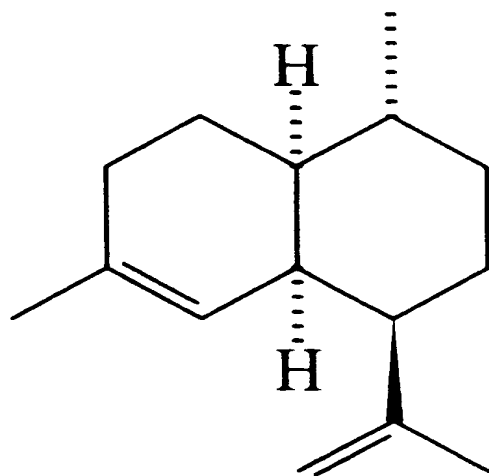
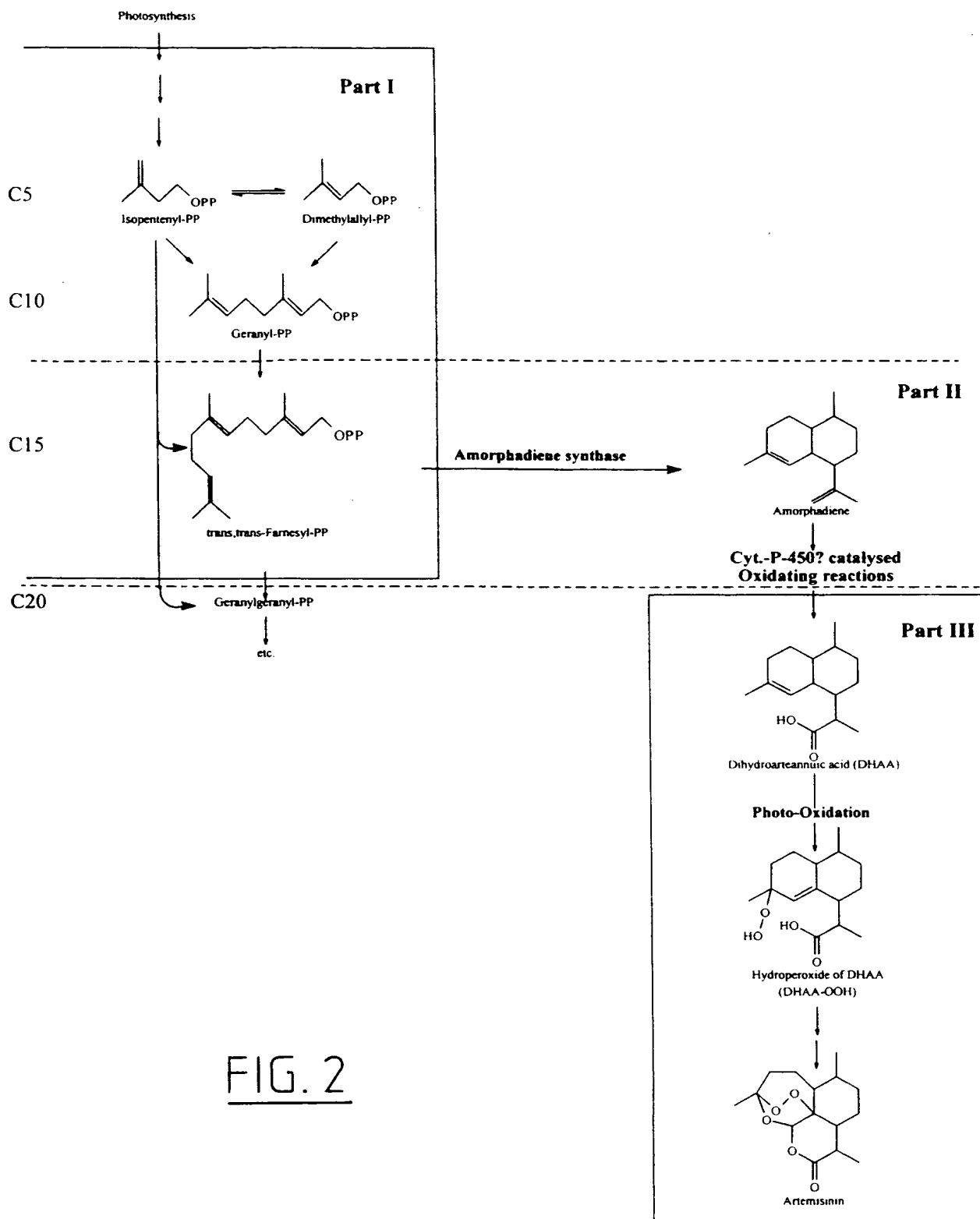
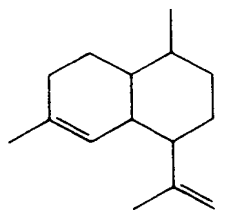


FIG. 4

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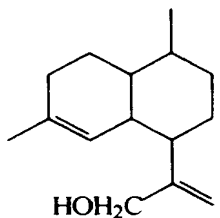
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Amorphadiene



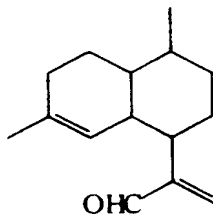
**Amorphadiene
hydroxylase (cyt P-450?)**



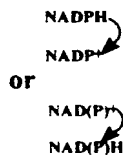
Amorphadienol



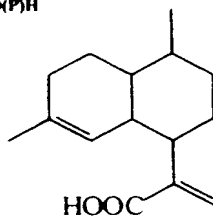
**Amorphadienol
oxygenase (cyt P-450?)**



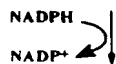
Amorphadienal



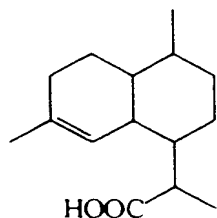
**Amorphadienal
hydroxylase (cyt P-450?)
or
Amorphadienal
dehydrogenase**



Arteannuic acid



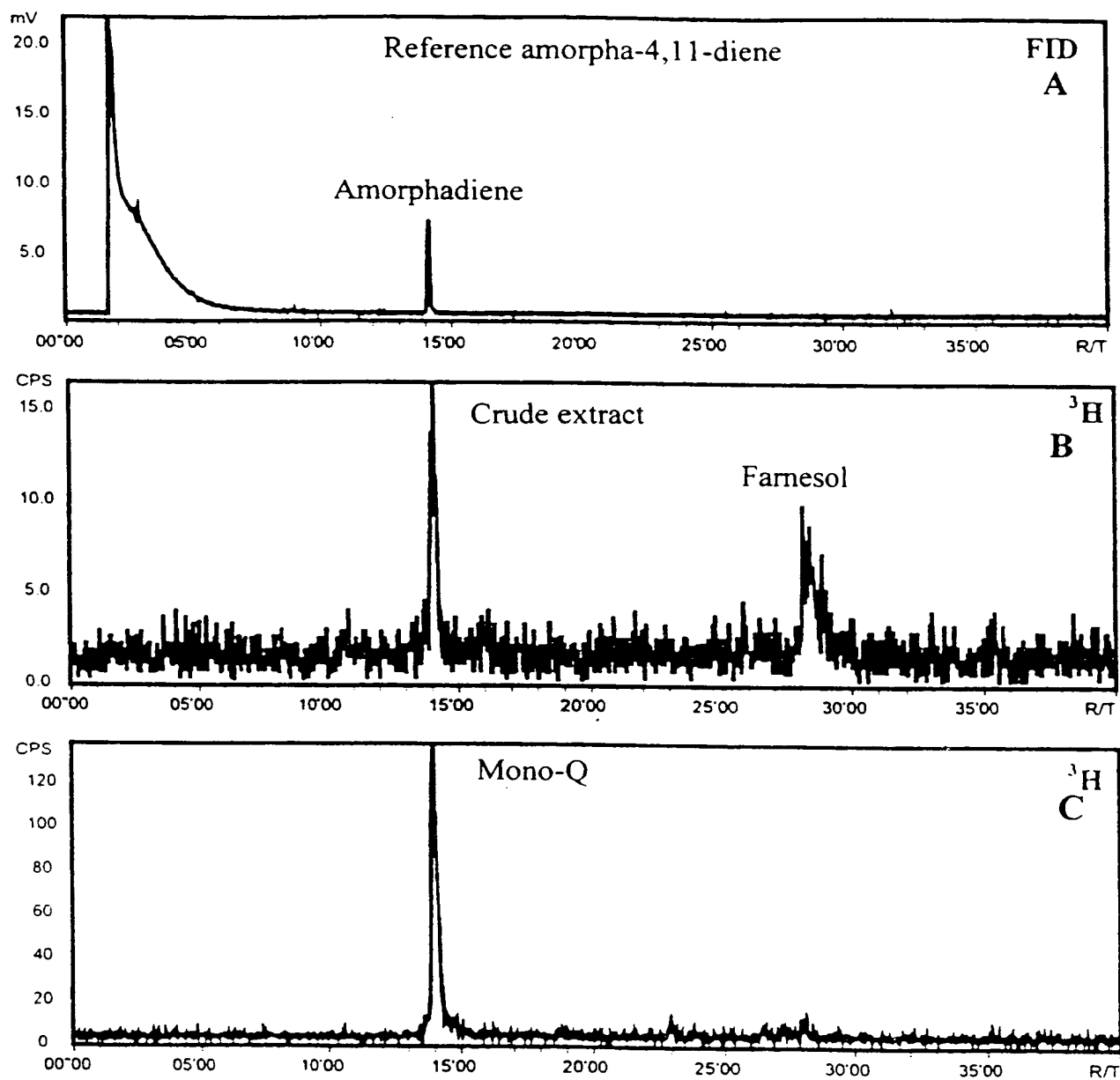
Arteannuic acid reductase (enoat reductase)



Dihydroarteannuic acid

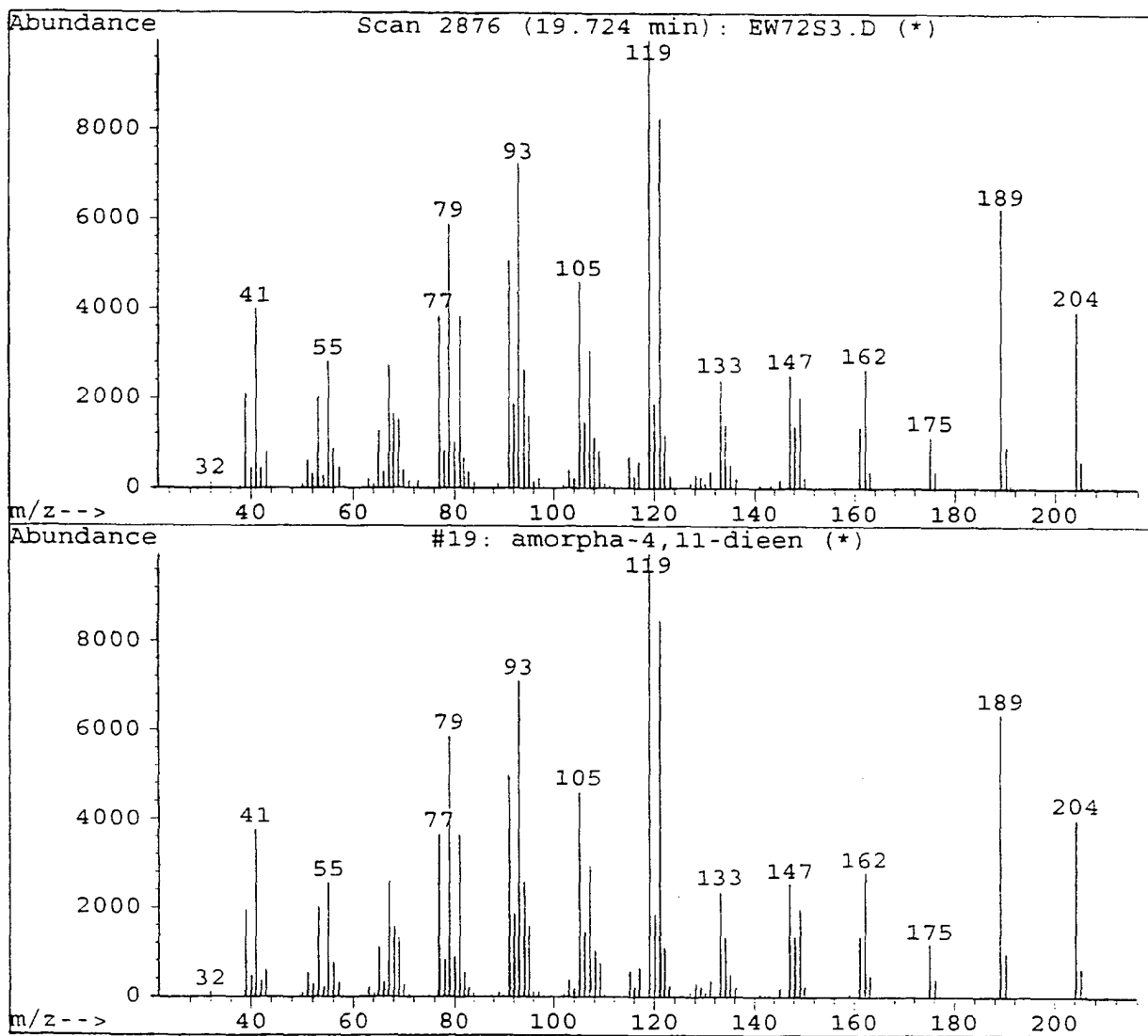
FIG. 3

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FIG. 5

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Library Searched : C:\DATABASE\WITLOF.L
Quality : 99
ID : amorpha-4,11-dien

FIG. 6

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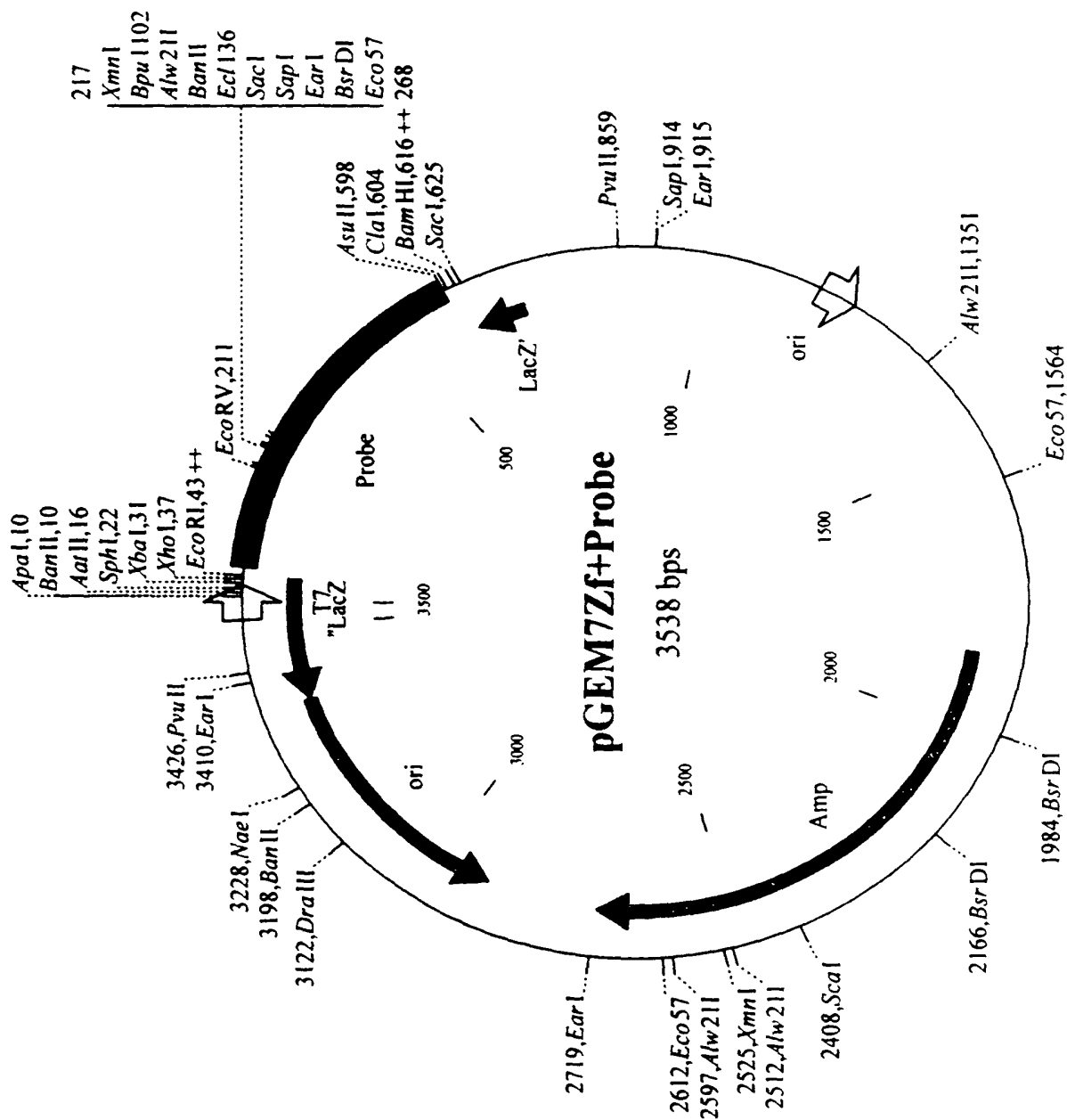


FIG. 7

27 gat gag aat ggg aaa ttt aag gaa tcg tta gct aat gat gtt gaa ggt ttg
 D E N G K F K E S L A N D V E G L
 78 ctt gag ttg tac gaa gca act tct atg agg gta cct ggg gag att ata tta
 L E L Y E A T S M R V P G E I I L
 129 gaa gat gct ctt ggt ttt aca cga tct cgt ctt agc att atg aca aaa gat
 E D A L G F T R S R L S I M T K D
 180 gct ttt tct aca aac ccc gct ctt ttt acc gaa ata caa cgg gca cta aag
 A F S T N P A L F T E I Q R A L K
 231 caa ccc ctt tgg aaa agg ttg cca aga ata gag gcg cag tac att cct
 Q P L W K R L P R I E A A Q Y I P
 282 ttc tat caa caa gat tct cat aac aag act tta ctt aaa ctt gct aag
 F Y Q Q Q D S H N K T L L K L A K
 333 tta gag ttc aat ttg ctt cag tca ttg cac aag gaa gag ctc agc cat gtg
 L E F N L L Q S L H K E L S H V
 384 tgc aaa tgg tgg aaa gct ttc gat atc aag aag aac gca cct tgt tta aga
 C K W K A F D I K K N A P C L R
 435 gat aga att gtt gaa tgc tac ttt tgg gga cta ggt tca ggc tat gag cca
 D R I V E C Y F W G L G S G Y E P
 486 cag tat tcc cgg gct aga gtt ttc ttc aca aaa gct gtt gct gtt ata act
 Q Y S R A R V F F T K A V I T
 537 ctt ata gac gac acc ttc gac gct acg g
 L I D D T F D A T

Primer A

Primer B

FIG. 8

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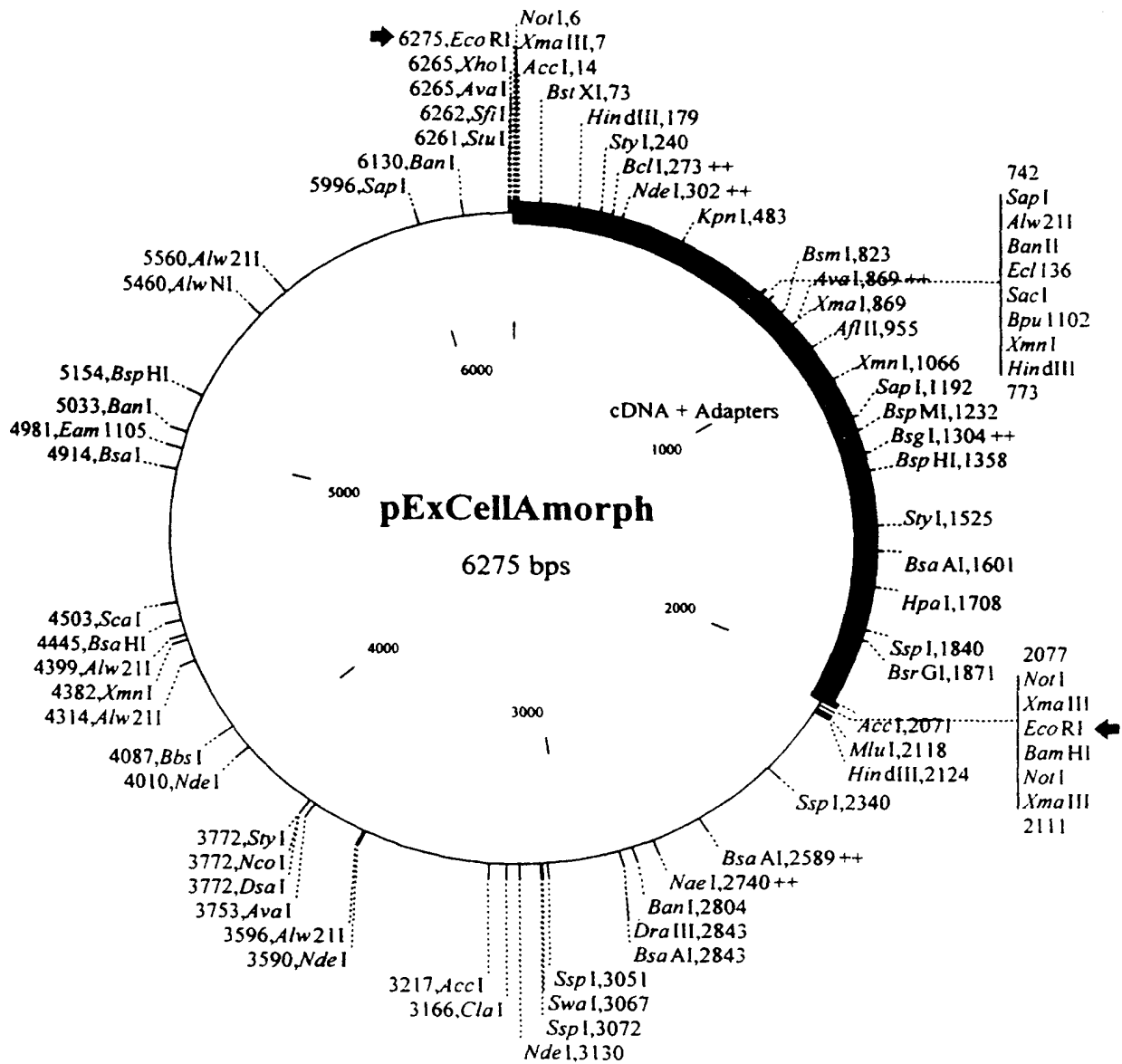


FIG. 9

[*EcoR* I (Not I) Adapter]
 1 aattcgcggc cgcgtcgaca aatcatgtca cttacagaag aaaaacctat
 N S R P R Q I M S L T E E K P
 ← *EcoR* I Not I
 51 tcgccccatt gccaaactttc ctccaagcat ttggggagat cagttttctca
 I R P I A N F P P S I W G D Q F L
 101 tctatcaaaa gcaagtagag caaggggttg aacagatagt gaatgattta
 I Y Q K Q V E Q G V E Q I V N D L
 151 aaaaaagaag tgcggcaact actaaaagaa gctttggata ttcctatgaa
 K K E V R Q L L K E A L D I P M
 201 acatgccaat ttgttgaagc tgattgatga aattcaacgc cttggaatac
 K H A N L L K L I D E I Q R L G I
 251 cgtatcactt tgaacgggag attgatcatg cattgcaatg tatttatgaa
 P Y H F E R E I D H A L Q C I Y E
 301 acatatgggtg ataactggaa tggtgaccgc tcttccttat gggtccgtct
 T Y G D N W N G D R S S L W F R
 351 tatgcgaaag caaggatatt atgttacatg tgatgttttc aataactata
 L M R K Q G Y Y V T C D V F N N Y
 401 aagacaaaaa tggagcgttc aagcaatcgt tagctaataga tgttgaagggt
 K D K N G A F K Q S L A N D V E G
 451 ttgcttgagt tgtacgaagc aacttctatg agggtagctg gggagattat
 L L E L Y E A T S M R V P G E I
 501 attagaagat gctcttgggt ttacacgata tcgtcttagc attatgacaa
 I L E D A L G F T R S R L S I M T
 551 aagatgcttt ttctacaaac cccgctcttt ttaccgaaat acaacgggca
 K D A F S T N P A L F T E I Q R A
 601 ctaaagcaac ccctttggaa aaggttgcca agaataagagg cggcgcagta
 L K Q P L W K R L P R I E A A Q
 651 cattcctttc tatcaacaac aagattctca taacaagact ttacttaaac
 Y I P F Y Q Q Q D S H N K T L L K
 701 ttgctaagtt agagttcaat ttgcttcagt cattgcacaa ggaagagctc
 L A K L E F N L L Q S L H K E E L
 751 agccatgtgt gcaaattggtg gaaagctttc gatatcaaga agaacgcacc
 S H V C K W W K A F D I K K N A
 801 ttgtttaaga gatagaattg ttgaatgcta cttttgggga ctaggttcag
 P C L R D R I V E C Y F W G L G S
 851 gctatgagcc acagtattcc cgggctagag ttttcttcac aaaagctggt
 G Y E P Q Y S R A R V F F T K A V

FIG. 10-1

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901 gctgttataa ctcttataga tgacacttat gatgcgtatg gtacttatga
A V I T L I D D T Y D A Y G T Y

951 agaacttaag atctttactg aagctgttga aaggtgggtca attacatgct
E E L K I F T E A V E R W S I T C

1001 tagacacact tccagaatac atgaaaccga tatacaaatt attcatggat
L D T L P E Y M K P I Y K L F M D

1051 acatacacag aaatggaaga atttcttgca aaggagggaa gaacagatct
T Y T E M E E F L A K E G R T D

1101 atttaactgc ggcaaagaat ttgtgaaaga gtttggttaga aacctgatgg
L F N C G K E F V K E F V R N L M

1151 ttgaagcaaa atgggcaaata gagggacaca taccaaccac tgaagagcat
V E A K W A N E G H I P T T E E H

1201 gatccagttg taatcattac tggcgggtgct aacctgctta caacaacttg
D P V V I I T G G A N L L T T T

1251 ttatcttggc atgagtgata tattcacaaa agagtctgtc gaatgggctg
C Y L G M S D I F T K E S V E W A

1301 tctctgcacc tcctcttttt agatactcag gtatacttgg tcgacgccta
V S A P P L F R Y S G I L G R R L

1351 aatgatctca tgaccacaaa ggccgagcaa gaaagaaaac atagttcatc
N D L M T H K A E Q E R K H S S

1401 gagccttgaa agttatatga aggaatataa tgtcaatgag gagtatgccc
S S L E S Y M K E Y N V N E E Y A

1451 aaaccttgat ttacaaggaa gtagaagatg tgtggaaaga tataaaccga
Q T L I Y K E V E D V W K D I N R

1501 gagtacctca caactaaaaa cattccaagg ccgttattga tggctgtgat
E Y L T T K N I P R P L L M A V

1551 ctatttgtgc cagtttcttg aagttcaata tgcaggaaag gataacttca
I Y L C Q F L E V Q Y A G K D N F

1601 cacgtatggg agacgaatac aaacatctca taaagtctct actcgtttat
T R M G D E Y K H L I K S L L V Y

1651 cctatgagta tatgactacc aatccttcgt gcatagccta tcaattatat
P M S I - L P I L R A - P I N Y

1701 tgaaagggtt aactatgcac gtctctatgg agagaatttc tcaagctatt
I E R V N Y A R L Y G E N F S S Y

FIG. 10-2

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```

1751  tggtgtttct  tgctggcaat  aataaatcag  acgcataaaa  ttgtattgaa
      L  V  F  L  A  G  N  N  K  S  D  A  -  N  C  I  E

1801  ctatatgccg  atagctatct  aaagttatta  tacaactaaa  atattcaaca
      L  Y  A  D  S  Y  L  K  L  L  Y  N  -  N  I  Q

1851  atggtattat  actttttactt  tgtacaaaag  caaaagtaca  ctactgttat
      Q  W  Y  Y  T  F  T  L  Y  K  S  K  S  T  L  L  L

1901  gtaacatttt  agttctatga  tacttttagtt  acgaatcggc  ttatatacat
      C  N  I  L  V  L  -  Y  F  S  Y  E  S  A  Y  I  H

1951  tgatacactt  ttatgcagaa  aaccctagta  aataaaaagt  cgatatcttg
      -  Y  T  F  M  Q  K  T  L  V  N  K  K  S  I  S

2001  tactacacat  atcgcacgaa  tttccgtttg  ccgtttgatat  ttacgatata
      C  T  T  H  I  A  R  I  S  V  C  R  L  Y  F  T  I

2051  gttattttaat  gaatatgttt  catgtggttg  ttgcttaaaa  aaaaagtcga
      C  Y  L  M  N  M  F  H  V  V  V  A  -  K  K  S  R
      [  NotI  ] EcoRI →
2101  cgcgccgcgcg  aa
      R  G  R  E
      EcoRI (NotI) Adapter

```

FIG. 10-3

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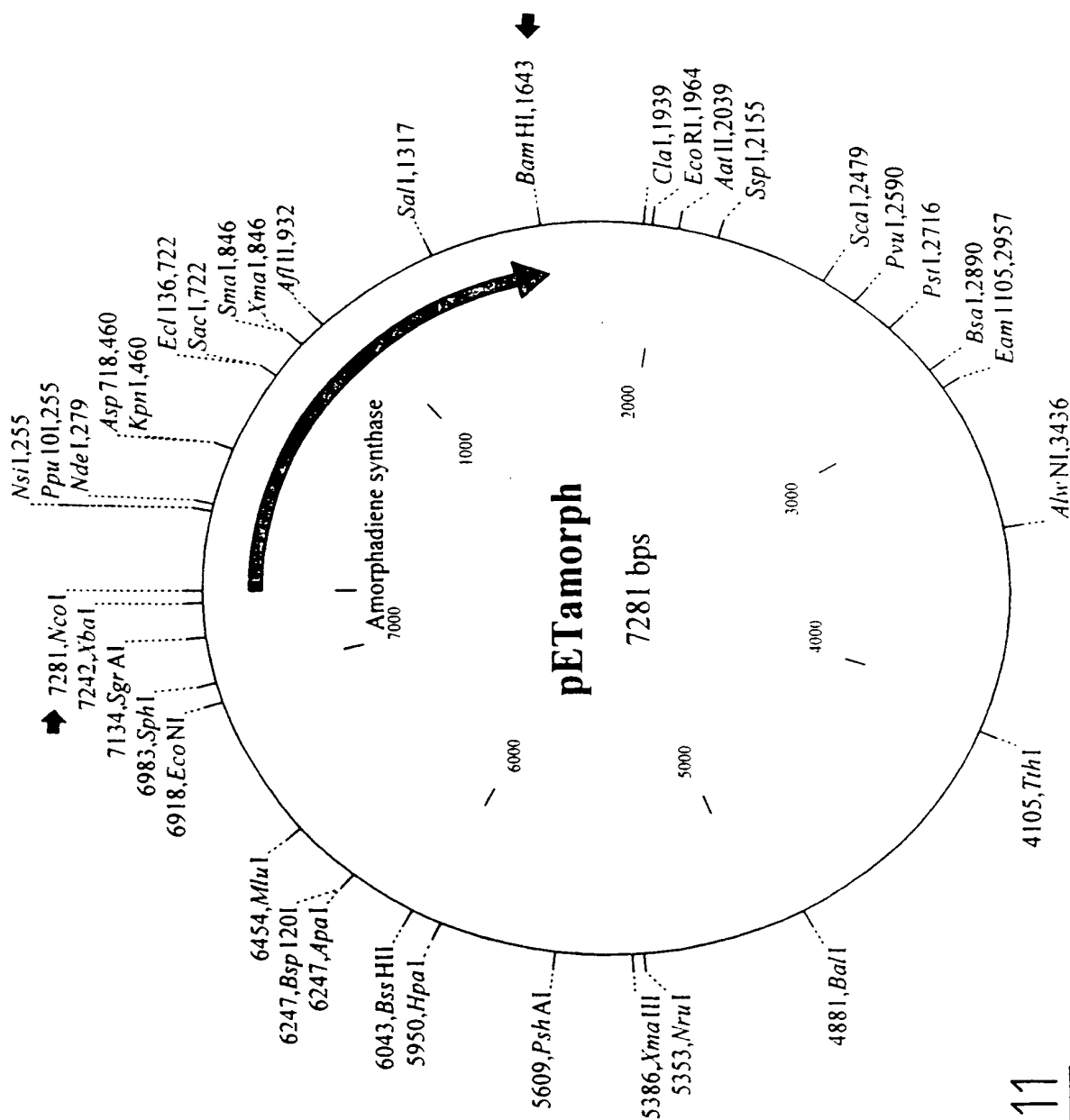


FIG. 11

[Nco I] 13/18

7281 ccatggcact tacagaagaa aaacctattc gcccattgc caactttcct
T M A L T E E K P I R P I A N F P
Start codon

50 ccaagcattt ggggagatca gtttctcatc tatcaaaagc aagtagagca
P S I W G D Q F L I Y Q K Q V E

100 aggggtggaa cagatagtga atgattttaa aaaagaagtg cggcaactac
Q G V E Q I V N D L K K E V R Q L

150 taaaagaagc tttggatatt cctatgaaac atgccaatTT gttgaagctg
L K E A L D I P M K H A N L L K L

200 attgatgaaa ttcaacgcct tggaataaccg tatcactttg aacgggagat
I D E I Q R L G I P Y H F E R E

250 tgatcatgca ttgcaatgta tttatgaaac atatggtgat aactggaatg
I D H A L Q C I Y E T Y G D N W N

300 gtgaccgctc ttccttatgg ttccgtctta tgcgaaagca aggatattat
G D R S S L W F R L M R K Q G Y Y

350 gttacatgtg atgttttcaa taactataaa gacaaaaatg gagcgttcaa
V T C D V F N N Y K D K N G A F

400 gcaatcggtta gctaattgatg ttgaaggttt gcttgagttg tacgaagcaa
K Q S L A N D V E G L L E L Y E A

450 cttctatgag ggtacctggg gagattatat tagaagatgc tcttggtttt
T S M R V P G E I I L E D A L G F

500 acacgatctc gtcttagcat tatgacaaaa gatgcttttt ctacaaaccc
T R S R L S I M T K D A F S T N

550 cgctcttttt accgaaatac aacgggcact aaagcaaccc ctttggaaaa
P A L F T E I Q R A L K Q P L W K

600 ggttgccaaag aatagaggcg gcgcagtaca ttcctttcta tcaacaacaa
R L P R I E A A Q Y I P F Y Q Q Q

650 gattctcata acaagacttt acttaaactt gctaagttag agttcaattt
D S H N K T L L K L A K L E F N

700 gcttcagtca ttgcacaagg aagagctcag ccatgtgtgc aaatgggtgga
L L Q S L H K E E L S H V C K W W

750 aagcttttga tatcaagaag aacgcacctt gttaagaga tagaattgtt
K A F D I K K N A P C L R D R I V

800 gaatgctact tttggggact aggttcaggc tatgagccac agtattcccg
E C Y F W G L G S G Y E P Q Y S

850 ggctagagtt ttcttcacaa aagctgttgc tggtataact cttatagatg
R A R V F F T K A V A V I T L I D

FIG. 12-1

900	acacttatga	tgcgatatggt	actttatgaag	aactttaagat	ctttactgaa
	D T Y	D A Y G	T Y E	E L K	I F T E
950	gctgttgaaa	ggtgggtcaat	tacatgctta	gacacacttc	cagaatacat
	A V E	R W S	I T C L	D T L	P E Y
1000	gaaaccgata	tacaaattat	tcatggatac	atacacagaa	atggaagaat
	M K P I	Y K L	F M D	T Y T E	M E E
1050	ttcttgcaaa	ggaggggaaga	acagatctat	ttaactgcfg	caaagaattt
	F L A	K E G R	T D L	F N C	G K E F
1100	gtgaaagagt	ttgttagaaa	cctgatgggt	gaagcaaaat	gggcaaatga
	V K E	F V R	N L M V	E A K	W A N
1150	gggacacata	ccaaccactg	aagagcatga	tccagttgta	atcattactg
	E G H I	P T T	E E H	D P V V	I I T
1200	gcggtgctaa	cctgcttaca	acaacttggt	atcttggcat	gagtgatata
	G G A	N L L T	T T C	Y L G	M S D I
1250	ttcacaaaag	agtctgtcga	atgggctgtc	tctgcacctc	ctcttttttag
	F T K	E S V	E W A V	S A P	P L F
1300	atactcaggt	atacttggtc	gacgcctaaa	tgatctcatg	acccacaagg
	R Y S G	I L G	R R L	N D L M	T H K
1350	ccgagcaaga	aagaaaacat	agttcatcga	gccttgaaag	ttatatgaag
	A E Q	E R K H	S S S	S L E	S Y M K
1400	gaatataatg	tcaatgagga	gtatgcccaa	accttgattt	acaaggaagt
	E Y N	V N E	E Y A Q	T L I	Y K E
1450	agaagatgtg	tggaaagata	taaaccgaga	gtacctcaca	actaaaaaca
	V E D V	W K D	I N R	E Y L T	T K N
1500	ttccaaggcc	gttattgatg	gctgtgatct	atttgtgcca	gtttcttgaa
	I P R	P L L M	A V I	Y L C	Q F L E
1550	gttcaatatg	caggaaagga	taacttcaca	cgtatgggag	acgaatacaa
	V Q Y	A G K	D N F T	R M G	D E Y
1600	acatctcata	aagtctctac	tcgtttatcc	tatgagtata	tgaggatcc
	K H L I	K S L	L V Y	P M S I	- G S
					Stop codon

FIG. 12-2

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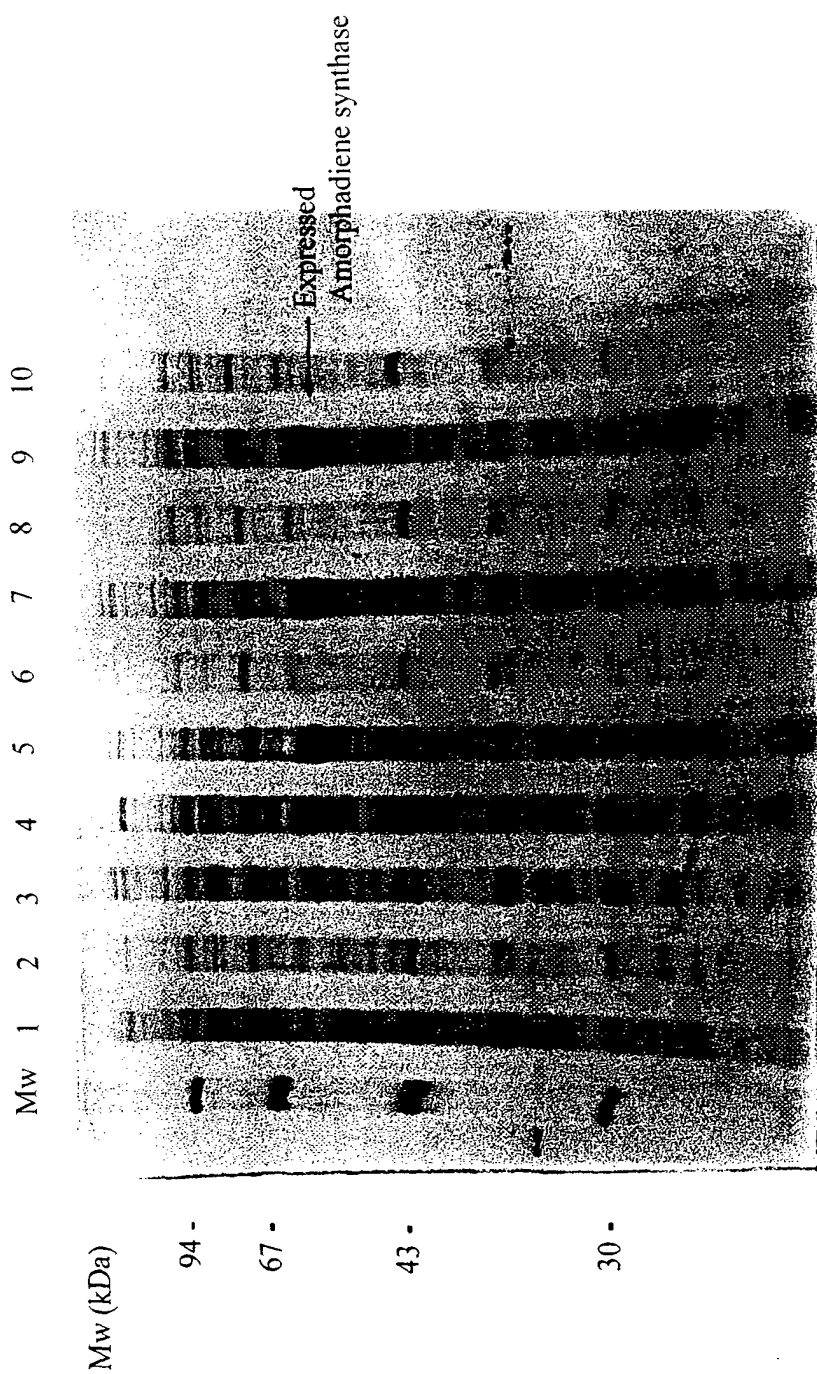


FIG. 13

WITLOF\EW2751B

monster 1 + amorph, farnesol

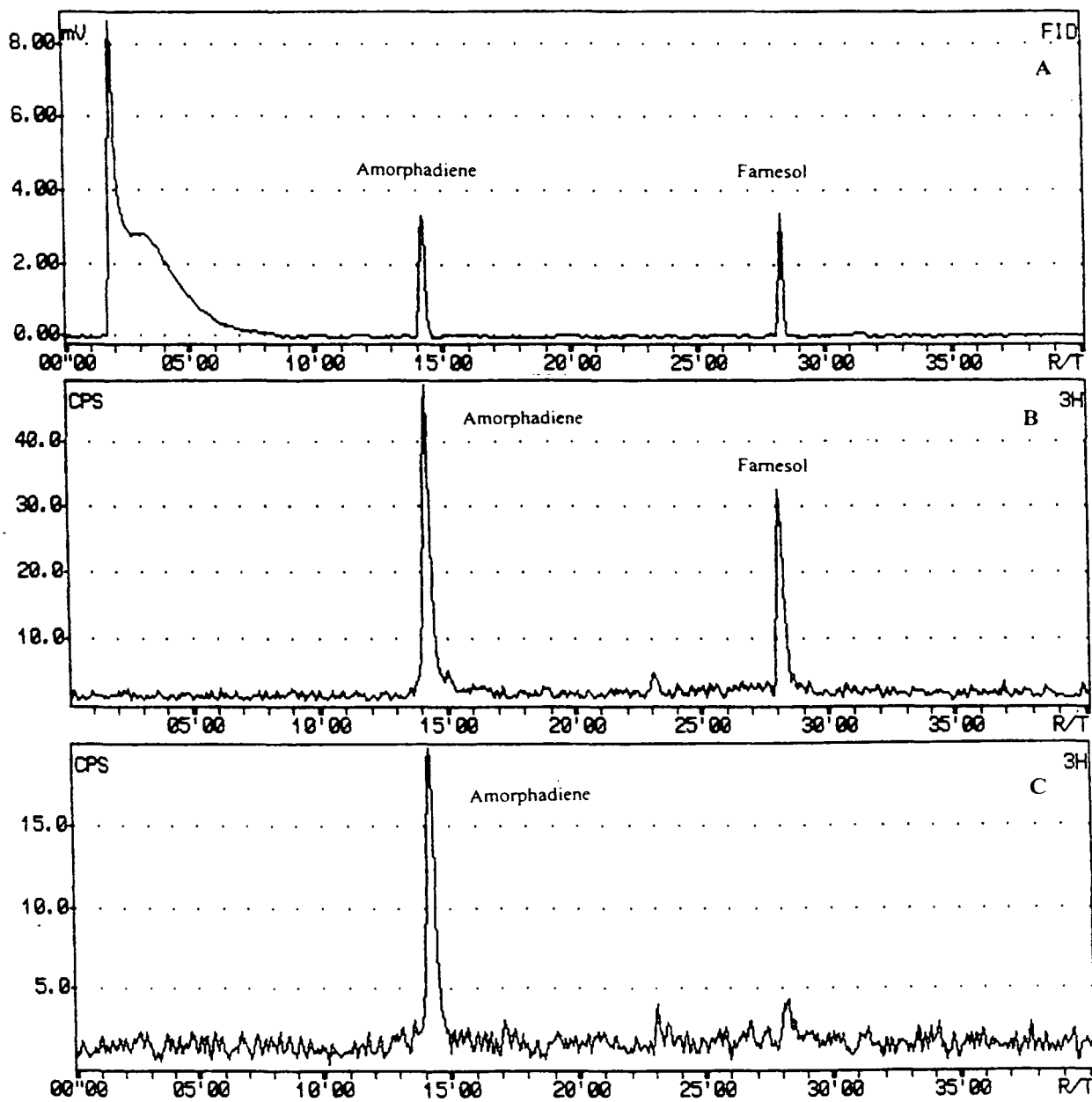


FIG. 14

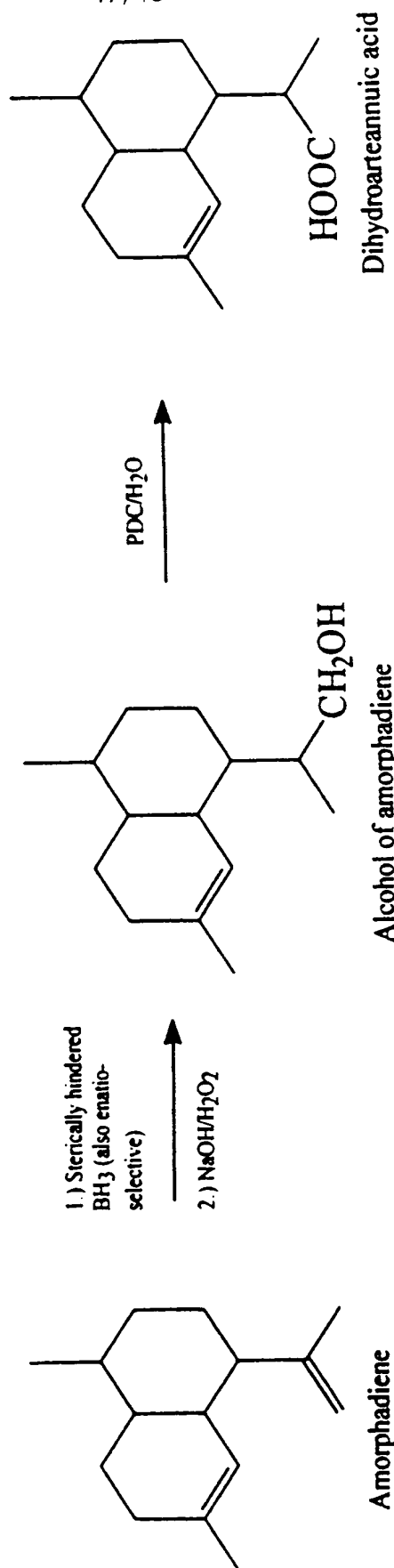


FIG. 15

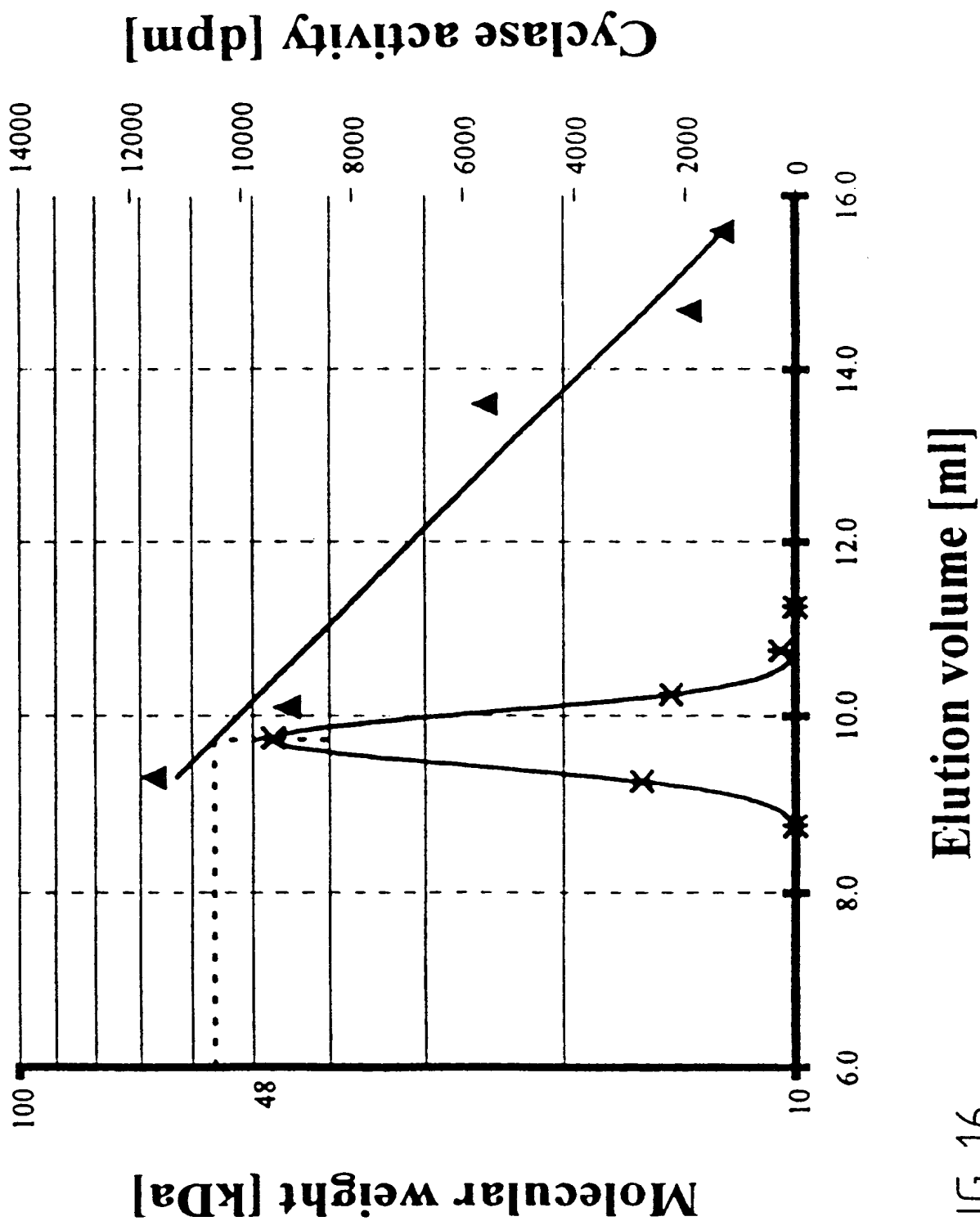


FIG. 16